Translation of the original instructions

Module 105(S)/142(S)

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1 Safety

1.1 Definition or warning notes

WARNING

Indicates potential danger. Non-observance of the safety provisions may cause death or severe injury.

CAUTION

Indicates potential danger. Non-observance of the safety provisions may cause property damage or injury.

NOTE Offers additional information.

1.2 General warning notes

The module must only be commissioned by specialists who received safety-technical instruction and are able to assess potential dangers. Furthermore, all chapters of these operating instructions must have been read and understood completely.

WARNING

The system must be powered down for all assembly, disassembly or repair work. There is a high danger of injury.

WARNING OF HOT SURFACE

During operation, heating of the motor, in particular of stepper motors, can cause burns of the skin when touching the motor. Install a protective device, if possible! Do not touch the marked areas or wait for an adequate cooling time.

CAUTION

Motor connectors must not be inserted or disconnected when live. Risk of burning of the contacts and risk of flying sparks.

CAUTION

Linear modules always have to be operated in connection with suitable safety devices (e.g., safety cell, protective room, protective housing, light curtain).

NOTE Observe the Declaration of Incorporation (see section *Declaration of incorporation, page 43*).

1.3 Special hazard warnings

In addition, this Original User's Manual also contains the following special hazard warning:

DANGER FROM CRUSHING

These places of the components pose the danger of crushing limbs in operation.

2 Intended use

The linear units module 105 and module 142 (see *Figure 1*) are precise linear adjustment units with circumfering toothed-belt drive. The types module 105 S and module 142 S are equipped with spindle drives (ball roller or trapezoid spindle). All linear units named are used as installation parts in connection with other components in the commercial area. In combination with many standardised installation elements and the other linear modules of IEF Werner GmbH (e.g. module 68, module 68 D, module 142 and module 142 S), complex multi-axis handling systems can be developed as well.

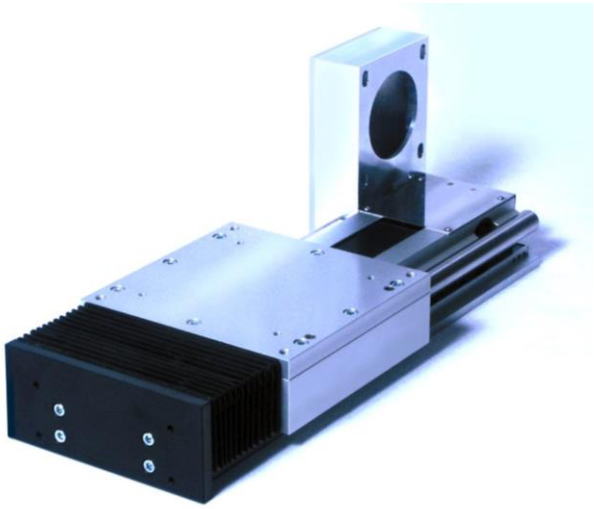


Figure 1: Module 142

The areas of use of these linear units are accordingly diverse.

They range from:

- Stop adjustment in the wood industry
- Equipment systems for SMD components
- Joining and press-in processes in precision mechanics
- Loading and unloading station of tool machines up to
- Manipulators for the packaging industry

2.1 Reasonably foreseeable misuse

The linear module M105(S) / M142(S) is **not** to be used for certain applications, and in particular not for such as the transport of persons and animals or as a pressing/bending device for cold working of metal.

Use of the linear units without additional measures is also **not** possible in special fields of application, such as the chemical or food industry or in explosive atmospheres.

In case of doubt, consult the manufacturer.

3 Assembly instructions

3.1 Installation position

The installation position is optional, i.e. the linear modules module 105 and module 142 can be used horizontally as well as vertically.

CAUTION

In the vertical installation position, use only motors with spring-operated brake to prevent the lowering of the drive in de-energized condition!

3.2 Module attachment

Use of clamping elements permits assembly-friendly attachment of the linear units module 105 and module 142 on a level installation surface. The drilling distance for installation surface depends on the construction series. For cross installation of the linear units, there are clamping elements in standard lengths that are equipped with the system drill template of the respective construction size (*see "Attachment of linear modules" Figure 2 to Figure 9 on pages 8 to 10*). For attachment of a linear module on an installation surface, continuous clamping profiles are preferable to clamping elements for safety reasons. This avoids shear points likely to cause accidents.

CAUTION

The clamping surface should have a levelness of 0.1 mm/m².

Do not use attachment bores installed in the basic body, because this may cause damage to internal parts and tension on the guide basis.

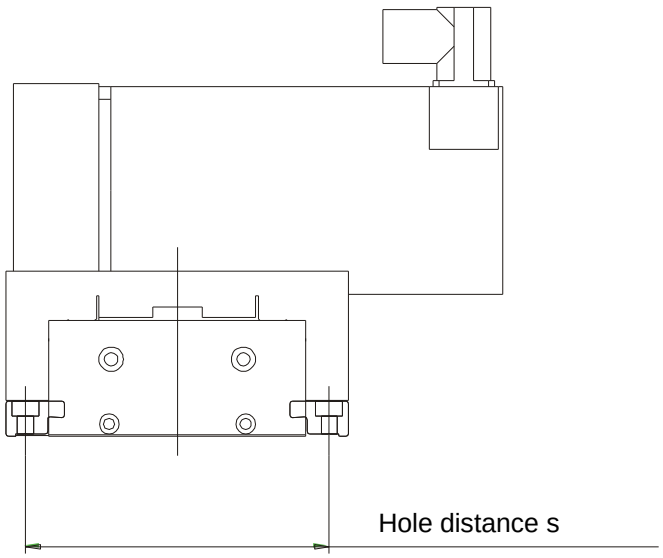


Figure 2: Attachment of the linear modules with clamping elements/clamping profile

Linear module	Hole distance s	Thread
Module 105	124 mm	M6
Module 142	168 mm	M8

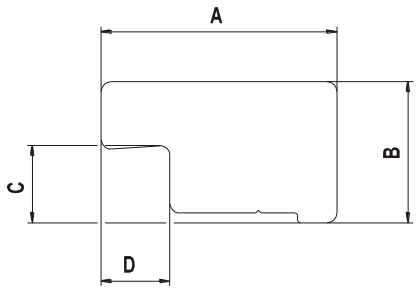


Figure 3: Scaled drawing clamping element/clamping profile

Linear module	A	B	C	D
Module 105 Module 105 S	24 mm	14.3 mm	7.7 mm	7 mm
Module 142 Module 142 S	30 mm	15.5 mm	7.9 mm	7.5 mm

Figure 4: Dimensions of the clamping elements or clamping profiles

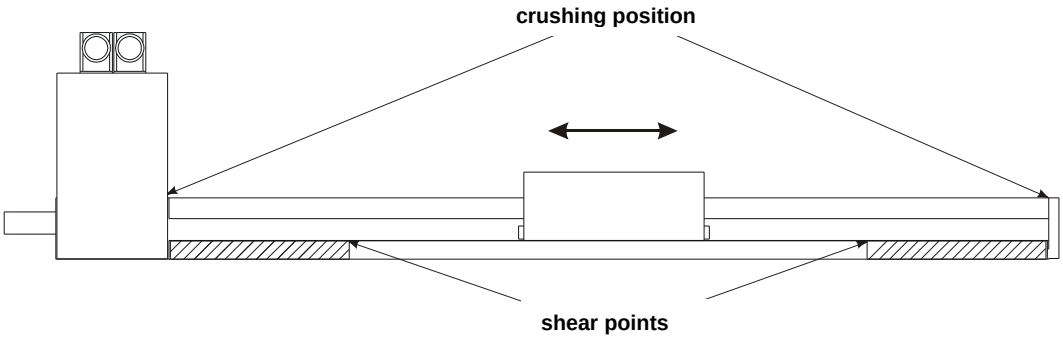


Figure 5: Attachment of the linear modules with standard clamping elements

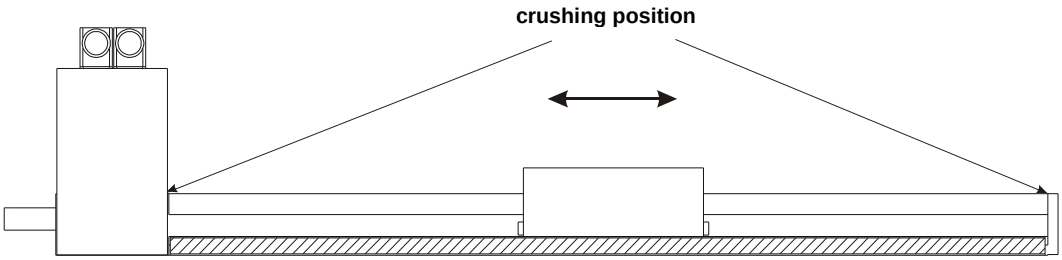


Figure 6: Attachment of the linear modules with continuous clamping profiles

Another version is attachment of the linear modules to their carriage. The basic body moves freely. However, the motor, motor, brake and limit switch cables, as well as the encoder or resolver cables have to be moved along. There are special connection screws for this type of attachment (*see Figure 8, page 10*).

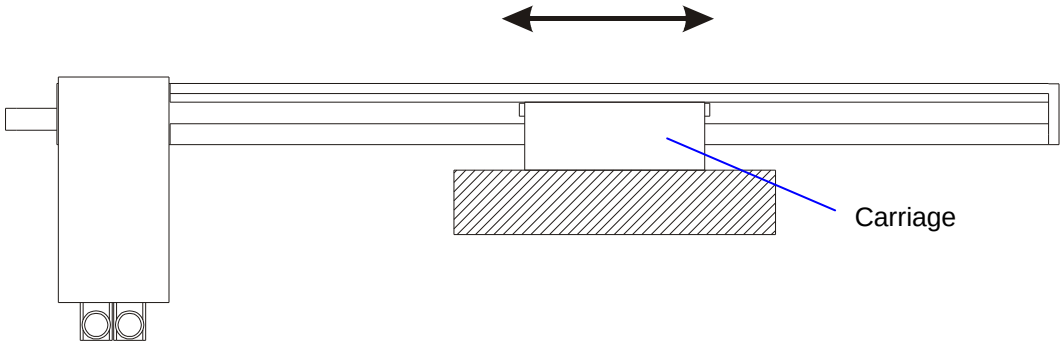
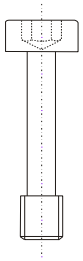


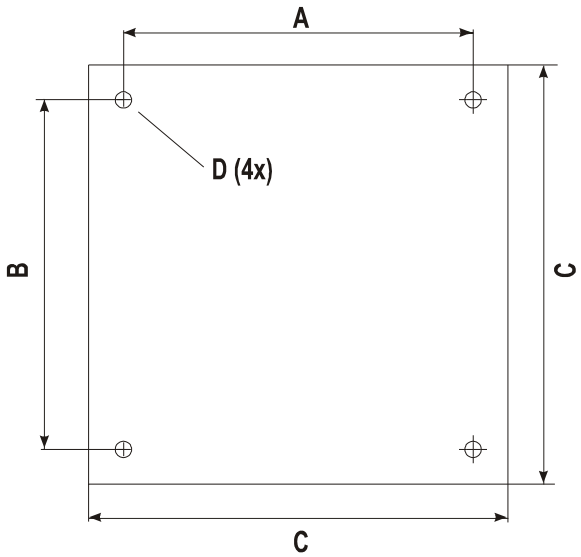
Figure 7: Attachmnet of the linear module to the carriage



Module 68, easyLINE, M105, M105S: M6

Module 142, Module 142 S: M8

Figure 8: Connection screw

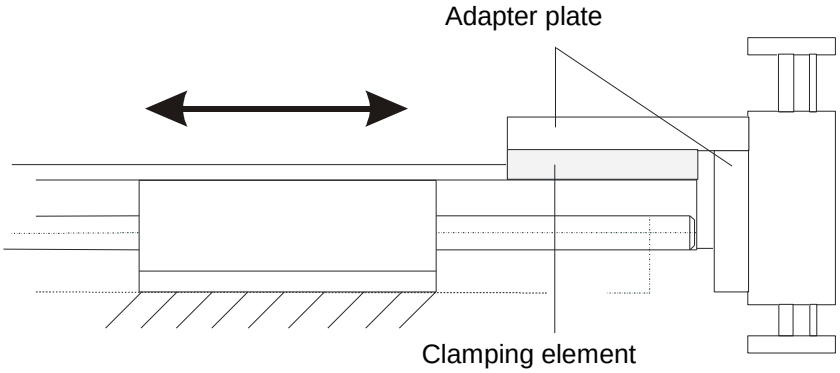


Linear module	A	B	C	Thread (D)
Module 105/Module 105 S	124 mm	124 mm	140 mm	M6
Module 142/Module 142 S	168 mm	168 mm	190 mm	M8

Figure 9: Mounting bores in the carriage

3.3 Installation of actuators

Actuators to be installed on the linear module (pick-up modules, cylinders) are usually attached to the linear unit using the drill template on the carriage (*see Figure 9, page 10*). If a setup according to *Figure 7, page 10* is used, actuators may be attached according to the illustration in *Figure 10*, *page 11* . Only very light-weight attachments (< 1 kg) may also be attached directly to the end plate. In this case, apply the end plate with a suitable drill template.



Type 140 (Module 105) resp. Type 190 (Module 142)

Figure 10: Installation example

3.4 Wiring

3.4.1 Motors

CAUTION

Wire the motors according to the motor data sheet!
When using customer-specific motors, inquire at the respective manufacturer for the cable suitable for this motor.

3.4.2 Initiators

Inductive proximity switches (PNP normally closed contacts, article number 025165) are used as standard stroke limit switches. These stroke limit switches are not safety limit switches according to EN60204-1.

Optionally, an additional reference point switch (PNP-normally open contact. article no. 726744) can be installed. The active button is marked with a coloured circle. Normally closed contacts are marked with a green, normally open contacts with a red dot. The initiators and their supply lines are protected in a cable channel integrated in the basic body, and are centrally wired to a plug.

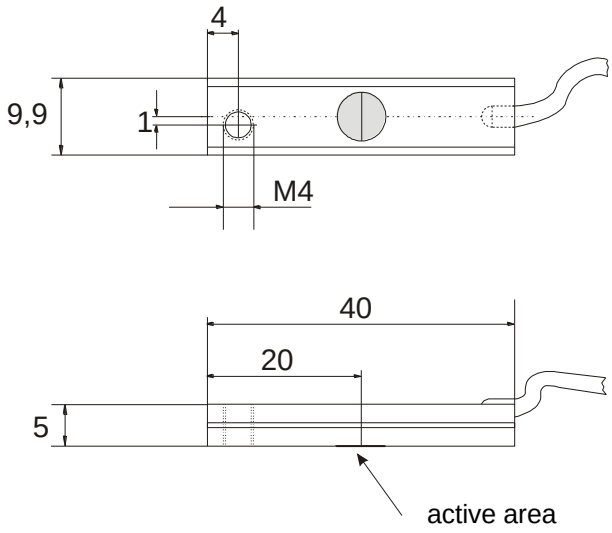


Figure 11: Initiator dimensions

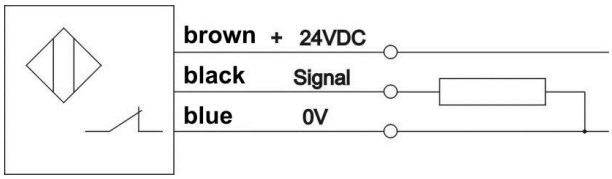


Figure 12: Connection designation PNP normally closed contact

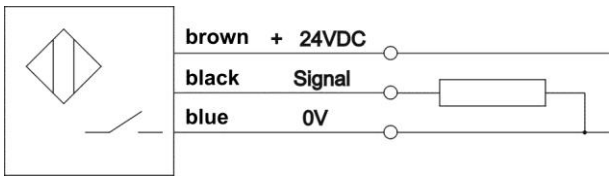


Figure 13: Connection designation PNP normally open contact

3.4.2.1 Technical data of the limit switches

Parameter	Value
Operating voltage	10...30 VDC
incl. residual ripple	≤ 15 %
Current load capacity	I_a ≤ 200 mA
Voltage drop at I_a max.	≤ 2.5 V
Switching frequency	≤ 1,000 Hz
Own current consumption	≤ 15 mA
Nominal switching distance on steel	1.5 mm ± 10 %
Switching hysteresis	3...20 %
Reproducibility (U = const.)	± 0.01 mm
Operating temperature	- 25° ... + 70° C
Protection class	IP 65
Short-circuit proof	yes
Protected against polarity reversal	yes

Pin-no.	assignment	IEF-cable
1	+ 24 V	brown
2	limit switch -movement	green
3	0 V	white
4	limit switch +movement	yellow
5	Reference switch	grey

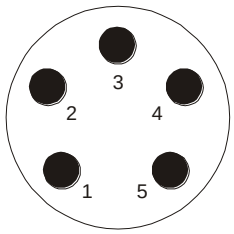


Figure 14: Plug assignment

3.4.3 Cable routing

For all moving cables, suitable cable routing has to be used to effectively prevent cable breaks. The minimum radius $\mathbf{r}_{min}$ for cable carriers results from the following formula:

For IEF cables: $\mathbf{r}_{min} \geq$ **10 x cable diameter.**

When different cables are used, EN 60204 must be observed. In addition, it must be ensured that a space reserve of 30% is kept free within the routing chains. A strain relief for the cables has to be attached at the outlet of the cable routing chain.

3.5 Technical data

	Module 105	Module 105 S	Module 142	Module 142 S
Repeating accuracy	+/- 0.04 mm	+/- 0.02 mm	+/- 0.04 mm	+/- 0.02 mm
Weight (without motor) at stroke 0	4.5 kg	6.3 kg	11.2 kg	11.2 kg
Weight increase per 100 mm stroke	0.8 kg	1.05 kg	1.25 kg	1.5 kg
Maximum movement speed	2 m/s	1 m/s	2 m/s	1 m/s
Torque Mx (s. *Figure 15*)	50 Nm	50 Nm	240 Nm	240 Nm
Torque My	70 Nm	70 Nm	230 Nm	230 Nm
Torque Mz	35 Nm	35 Nm	110 Nm	110 Nm
Carrying capacity C1	1,500 N	1,500 N	3,800 N	3,800 N
Carrying capacity C2	700 N	700 N	2,100 N	2,100 N

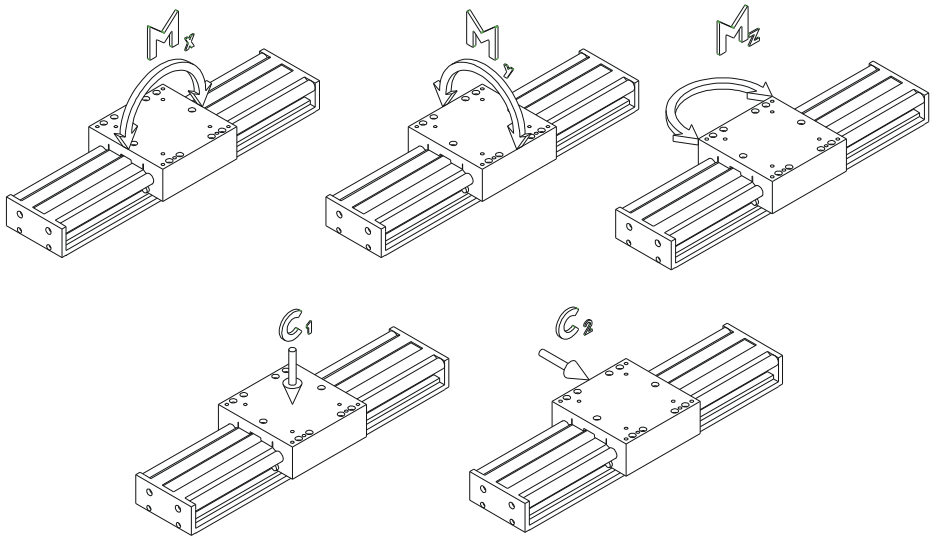


Figure 15: Torques and carrying capacity module 105 and module 142

3.5.1 Critical spindle speed

While the maximum movement speed in linear modules with toothed-belt drive is generally limited by the drive motor, the critical spindle speed in linear modules with spindle drive require observation of the critical spindle speed. It determines the maximum possible movement speed, in particular for longer strokes (*see Figure 16, page16)* movement speed calculated from the spindle speed according to the following equation:

$$v = n/60 * h$$

v = movement speed [mm/s]

n = spindle speed [rpm]

h = spindle pitch [mm]

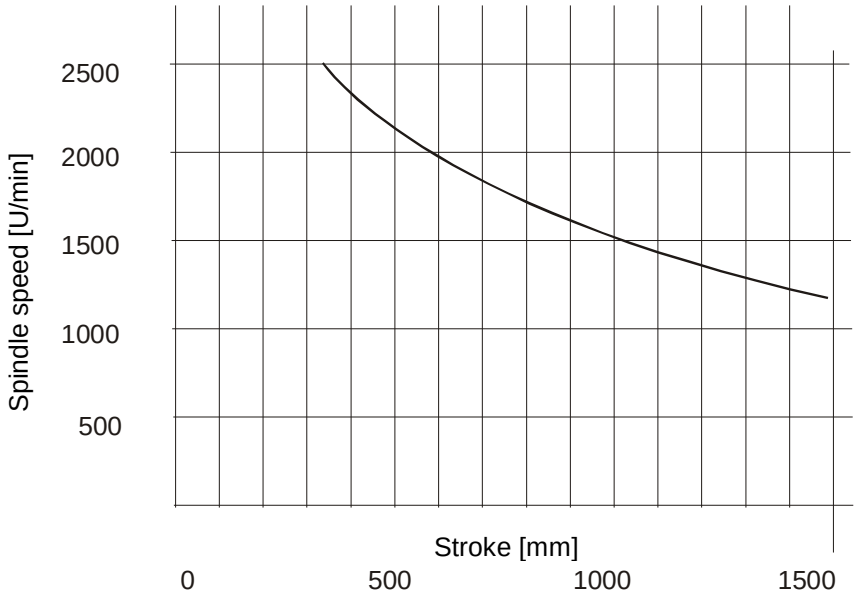


Figure 16: Critical spindle speed

3.5.2 Type label

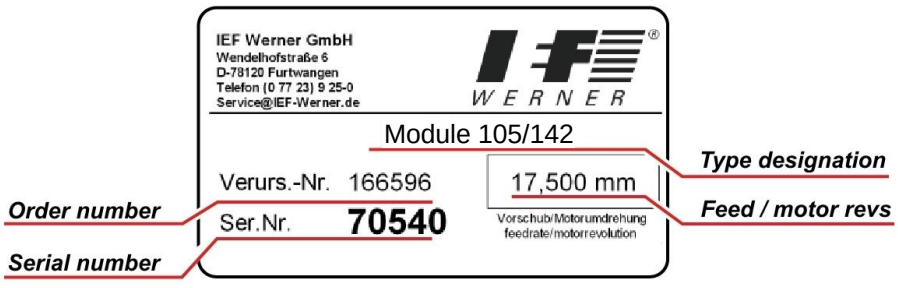


Figure 17: Type label (example)

3.5.3 Technical data when using a planetary gear

Before commissioning, observe the possible input speeds of the gear manufacturers. Too-high input speeds can lead to increased wear at the gear and/or thermal problems.

The accuracy of the linear unit is influenced by the reverse play of the gears.

Example:

The gear reverse play (S) is 9 angle minutes.

How high is the reverse play at the carriage of the linear unit?

Infeed constant of the linear unit (Vk): 140 mm

Reverse play at the carriage = (Vk • S) / (360 x 60)

= (140 mm • 9) / (360 x 60)

= 0.058 mm

Consider the information of the respective gear manufacturer in any case.

e.g. http://www.neugart.de/index.php/de/Produkte/Standardgetriebe

http://www.wittenstein-alpha.de/spielarme-planetengetriebe.html

4 Maintenance

During the design of the linear module series, great importance was placed on the use of low-maintenance components. All roller elements were provided with lifetime lubrication in the factory. To avoid danger of over-lubrication of the linear bearings, no external lubrication nipples were attached to the carriage part. However, to achieve a high service life of the wipers, we recommend moistening the guide shafts with special grease at regular intervals. Proceed accordingly when using a ball screw. The lubricant may be procured from IEF in tubes of 50 gram each (special grease for linear bearings: Article no. 732934; special grease for spindles: article no. 729148). If a bellows is used, it should also be regularly cleaned from gross contamination.

The recommended maintenance intervals add up to approx. 200 operating hours under regular ambience conditions. Under difficult conditions (high dust share, high humidity, high temperature), the maintenance intervals should be reduced.

NOTE Never use compressed air for cleaning.

5 Troubleshooting

Interference	Reason	Correction
Increased running noise	Nominal service life of linear bearing exceeded	Replace all linear bearings
	Linear bearing worn from overload (too-high torque, etc.)	Replace all linear bearings, reduce load
	Linear bearing worn from strong contamination	Replace all linear bearings, clean guide elements guide shafts more often if required or use bellows
	Guide shafts worn	Replace guide shafts, replace all linear bearings, check load, protect linear module from strong contamination, use bellows if required
	Guide shafts corroded	Replace guide shafts, replace linear bearing if required, lubricate guide shafts more often
	Deflection unit worn	Replace deflection unit
	Drive unit worn	Replace drive unit
	Toothed belt runs dry	Slightly lubricate toothed belt on the toothed inner side
	Toothed belt tension too high	Install reconciled spacer sleeves as shaft stop
	Toothed belt runs diagonally	Align toothed belt with belt fastener (carriage plate and tappet), install reconciled spacer sleeves
	Toothed belt strongly contaminated on the toothed inner side	Replace toothed belt, protect linear module from strong contamination
	Toothed belt defective	Replace toothed belt
	Motor (motor bearing) defective	Replace motor
	Motor with brake, brake does not open	Apply current to the brake, if the brake still does not open, replace motor
Linear drive unit does not move	Limit switch cable not connected.	Connect the cable
	Limit switch defective	Replace limit switch
	Limit switch cable defective	Check limit switch cable
	Solder connection on socket has come loose	Solder on wires
	Motor connected incorrectly	Check and change connector assignment, if required
	Motor defective	Replace motor
	Error in power electronics or control unit	Check the power electronics or the control unit
	Motor cable defective	Check motor cable, replace cable, if required

Troubleshooting, continued

Interference	Reason	Correction
Reverse play too large	Gearbox toothed belt not tensioned	Tension gear toothed belt
	Motor toothed disk has play (key connection)	Replace motor toothed disc if motor shaft keyway is damaged, replace motor
	Tension drive toothed belt	Pull deflection unit to stop on spacer sleeves
Linear drive unit moves mechanically against the stop during the reference run	Incorrect direction of rotation	Change motor direction of rotation
	Broken motor cable	Replace cable

6 Repair instructions

WARNING

Always power down the system before starting repairs.

WARNING

Any repairs must only be performed by specialist personnel who have read and understood the operating instructions.

CAUTION

Only use original replacement parts, otherwise IEF Werner GmbH will not accept any warranty.

6.1 Module 105 and Module 142

6.1.1 Replacement of the linear bearings

Disassembly sequence:

- Loosen the two central connection screws in running direction to uncouple the carriage unit from the tappet (toothed belt). See *Figure 18*, bottom, **A**.

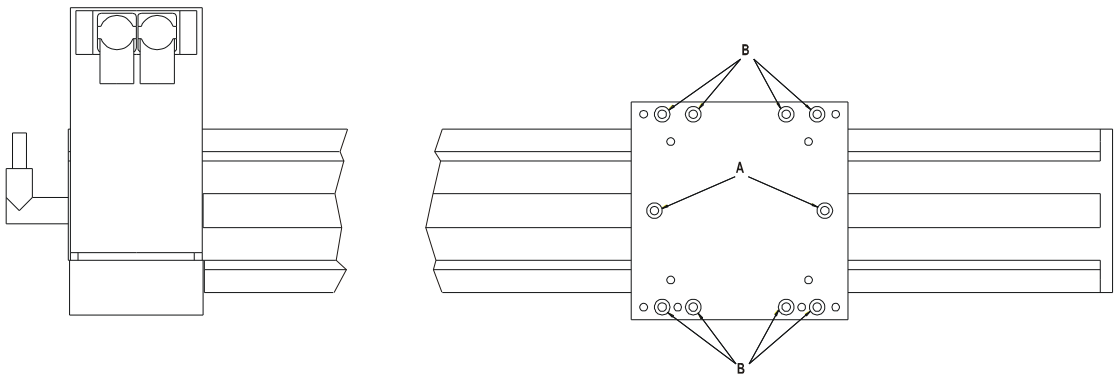


Figure 18: Top view linear unit

- Remove the deflection-side end plate by loosening the four connection screws (**C**). The toothed belt is relieved (see *Figure 19, bottom*).

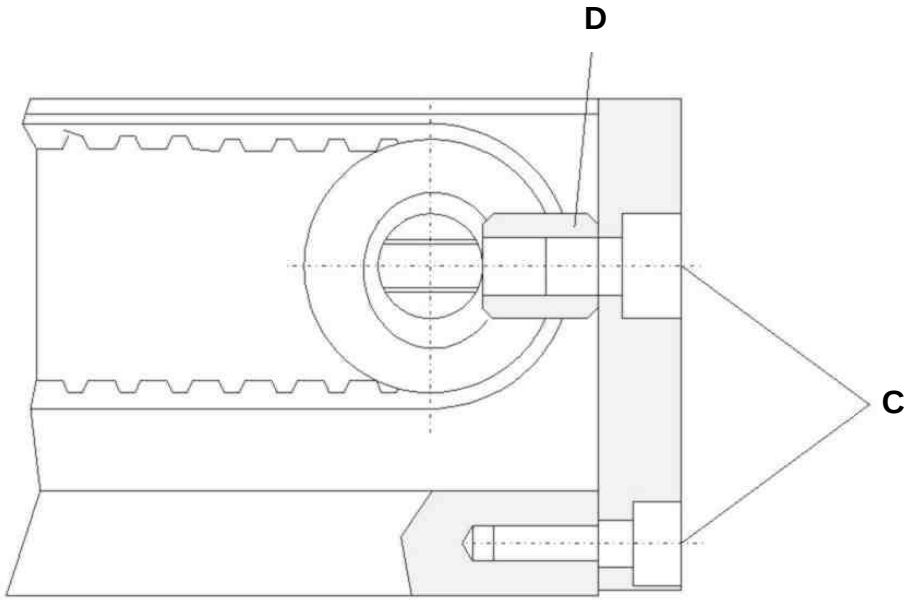


Figure 19: Deflection unit

- Pull the entire carriage unit from the guide shafts.
- Push the defective linear bearings from the fitting bores.

CAUTION

As of 07/99, the linear bearings are secured with threaded pins. Remove threaded pins before uninstalling the linear bearings. After replacement of the linear bearings, install the threaded pins again as safety device.

Assembly sequence:

- Install new, greased linear bearings.
- Before installing the carriage unit, the screw connection (**B**) between carriage plate and clamping block (see *Figure 18, page 21*) must be loosened to avoid tensioning of the linear bearings during insertion into the guide.
- Install end plate

NOTE Attention: The two spacer sleeves (see *Figure 19*, top, **D**) must be installed as shaft stop to reproducibly limit the clamping path of the toothed belt.

- Tighten the connection screws (see *Figure 18*, *page 21*, **B**) between carriage plate and clamping block.
- Connect tappet and carriage unit (see *Figure 18*, *page 21*, **A**)

6.1.2 Replacement of the deflection unit

Disassembly sequence:

- Disconnect the carriage unit from the tappet by loosening the two connection screws centrally installed in running direction (see *Figure 18*, *Page 21*, **A**).
- Remove the end plate by loosening the four connection screws (**C**). The toothed belt is relieved (see *Figure 19, page 22*).
- Open the tappet by loosening the connection screws (see *Figure 20*, bottom, **E**).

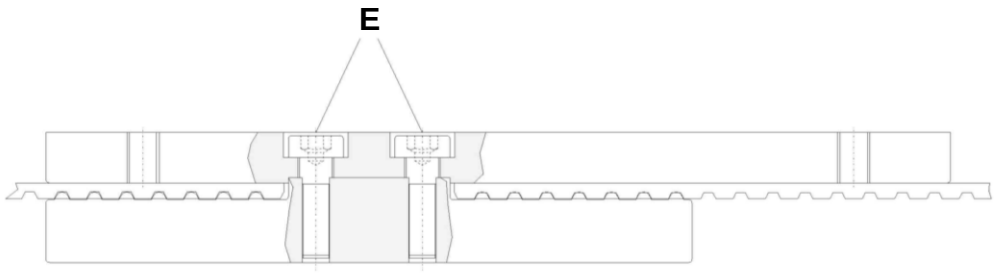


Figure 20: Belt parts fastener (tappet).

- Replacement of the conversion unit, old spacer sleeves are reused!
  (see *Figure 19, page 22*, **D**).

CAUTION

Ensure that the axial bearing unit has enough play inside the basic body.

- Connect the toothed belt to the tappet (see *Figure 20*, top, **E**).
- Attach end plate (see *Figure 19, page 22*, **C**).

NOTE The two spacer sleeves (**D**) must be installed as shaft stop to reproducibly limit the clamping path of the toothed belt. The old spacer sleeves should be reused!

- Connect carriage unit and tappet (see *Figure 18*, *page 21*, **A**)

6.1.3 Motor replacement module 105

Version 1

Disassembly sequence:

- Remove/loosen the connection screws of the motor flange; the gear toothed belt is relieved (see *Figure 21*, bottom, **F**).

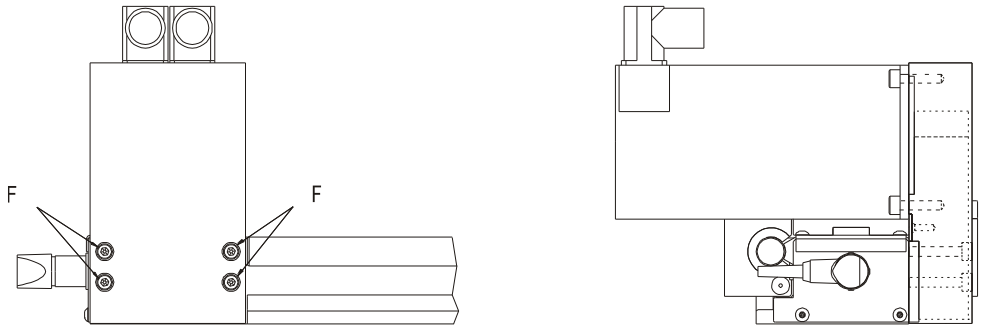


Figure 21: Linear unit and belt gear drive, version 1

- Loosen connection screws between motor and motor flange. Take out motor by tilting up and pulling towards the back.
- Remove motor toothed disc from the motor shaft and then install it on the new motor.

Motor toothed disc is built differently depending on order (see *Figure 22,* bottom):

- Type 1: Toothed disc with separate clamping set
- Type 2: Toothed disc with integrated clamping set and central clamping
- Type 3: Toothed disc with integrated clamping cone and 5 clamping screws
- Type 4: Toothed disc with keyway

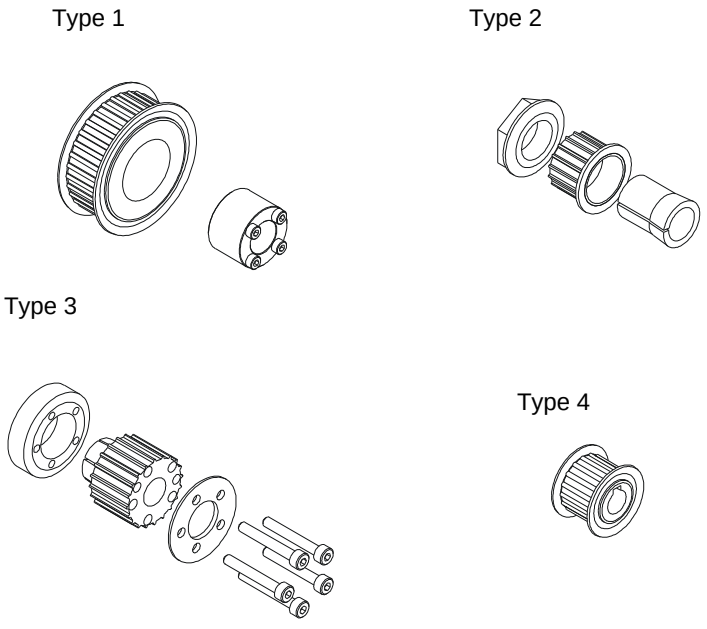


Figure 22: Motor toothed disc designs

CAUTION

Do not impact the motor shaft.

Assembly sequence:

- Wire the new motor according to the motor data sheet.
- Check direction of rotation
- Install motor to motor flange.
- Push motor and motor flange away from the basic body; the gear toothed belt is tensioned; then
- tighten connection screws (see *Figure 21, page 24*, **F**).

Version 2

Disassembly sequence:

- Remove the motor flange cover by loosening the attachment screws (**G**), see *Figure 23, bottom*).

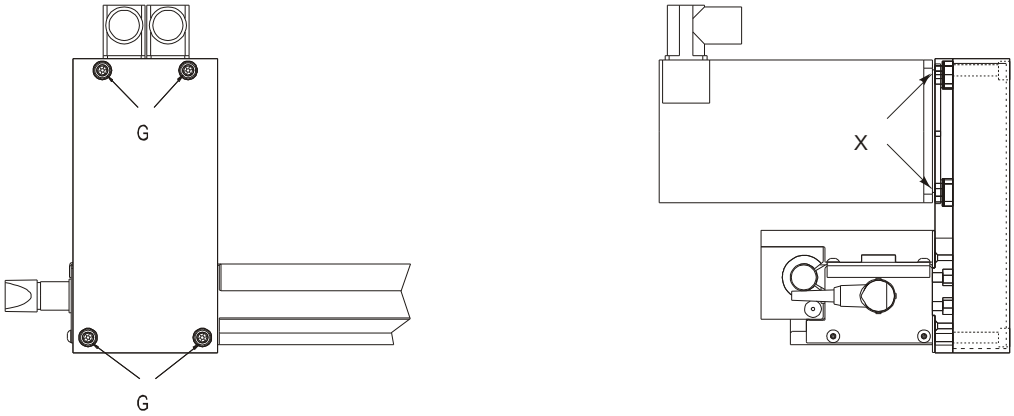


Figure 23: Linear unit and belt gear drive, version 2

- Uncouple the motor and motor flange plate by loosening the attachment screws.
- Remove motor toothed disc (see *Figure 22, page 24*) from the motor shaft

Assembly sequence:

- Install motor toothed disc (see *Figure 22, page 24*) on the new motor
- Wire the new motor according to the motor data sheet
- Check direction of rotation
- Install motor to motor flange plate. Before tightening the attachment screws, push the motor away from the basic body; the gear toothed belt is tensioned; then
- Tighten the attachment screws
- Attach the motor flange cover again

6.1.4 Replace gear toothed belt module 105

Version 1

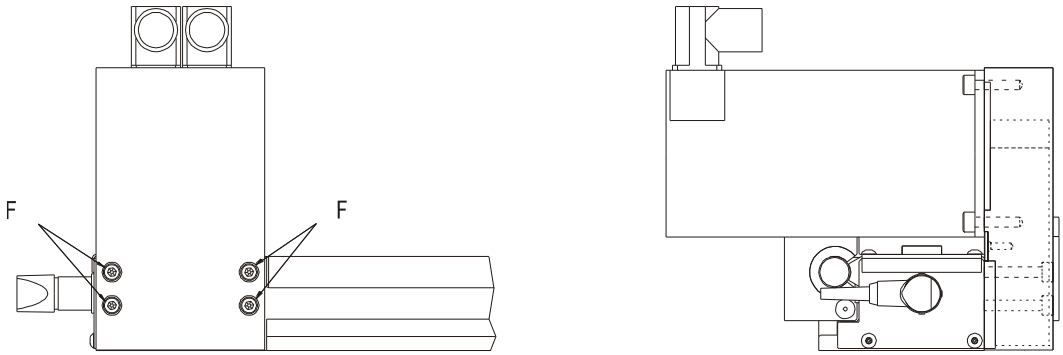


Figure 24: Belt gear, version 1

- Remove the motor (see section *Motor replacement module 105, page 24*)
- Remove motor flange by loosening the connection screws (**F**).
- Replace gear toothed belt
- Attach motor flange again but do not screw it on yet
- Install motor
- Push motor and motor flange away from the basic body. The toothed belt is tensioned.
- Screw on motor flange (see *Figure 21, page 24*, **F**).

Version 2

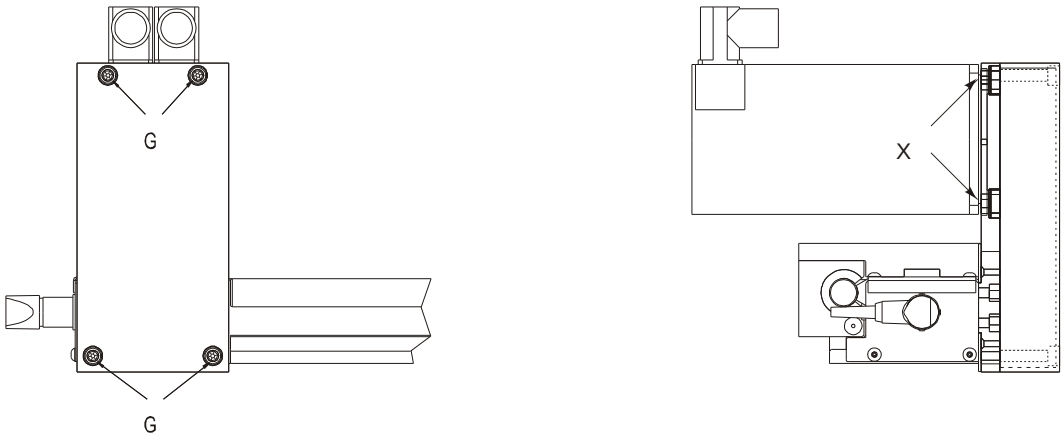


Figure 25: Belt gear, version 2

- Remove motor flange cover (**G**) (see section *Motor replacement module 105, page 24*)
- Loosen motor attachment screws (**X**). The motor can then be easily pushed towards the basic body. The toothed belt is relieved.
- Replace toothed belt.
- Push the motor away from the basic body. The toothed belt is tensioned. Tighten motor attachment screws (**X**).
- Attach the motor flange cover (**G**)

6.1.5 Motor replacement module 142

Disassembly sequence:

- Remove the motor flange cover by loosening the screws (see *Figure 26*, bottom **X**).

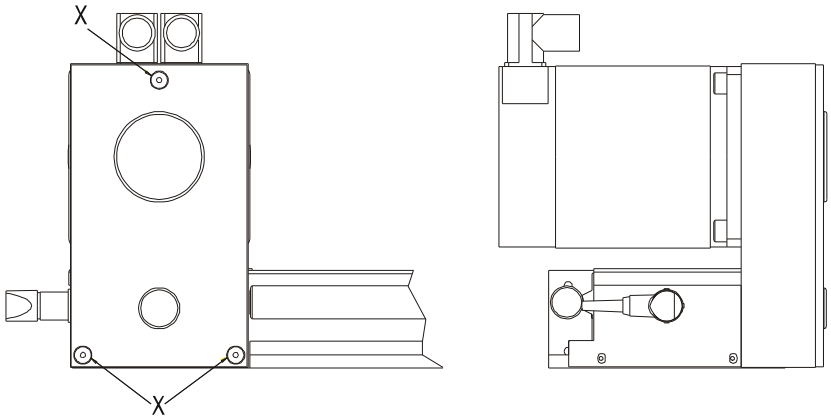


Figure 26: Belt gear of module 142

- Loosen motor attachment screws
- the toothed belt is relieved.
- Remove the motor
- Remove motor toothed disc (see *Figure 22, page 24*) from the motor shaft and then install new motor

CAUTION

Do not impact the motor shaft.

Assembly sequence:

- Wire the new motor according to the motor data sheet. Check direction of rotation
- Install motor to motor flange.
- Push the motor away from the basic body; the gear toothed belt is tensioned. Then tighten the motor attachment screws
- Attach the motor flange cover again

6.1.6 Replace gear toothed belt module 142

- Remove motor flange by loosening the attachment screws (**X**) (see *Figure 26, page 27*).
- Loosen the motor attachment screws; the toothed belt is relieved
- Replace defective gear toothed belt with new gear toothed belt
- Push the motor away from the basic body; the gear toothed belt is tensioned. Then tighten the motor attachment screws
- Attach the motor flange cover again.

6.1.7 Replacing the initiator

- Remove the motor-side front sheet with plug (see *Figure 27*, bottom, **H**).

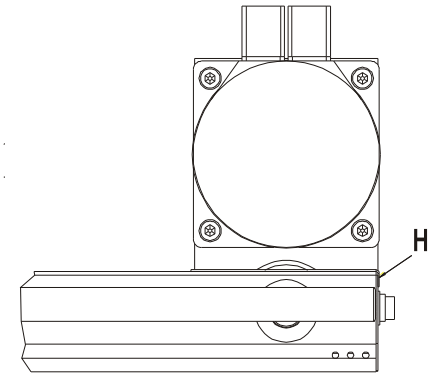


Figure 27: Belt gear, motor-side view

- Desolder the initiator cable from the installation plug. Then pull out the cover strip serving as profile groove cover and the defective initiator
- Insert the new initiator and cover strip again
- Insert initiator cable into the basic body through the bore
- Solder the initiator cable to the installation plug.
- Attach the sheet again; install the motor again if required.

6.1.8 Replacing the drive toothed belt

Disassembly sequence:

- Disconnect the carriage unit from the tappet by loosening the two connection screws centrally installed in running direction (see *Figure 18, Page 21*, **A**).
- Remove the deflection-side end plate by loosening the four connection screws (**C**). The toothed belt is relieved (see *Figure 19, page 22*).
- Remove the motor-side angle plate (see *Figure 27, page 28*, **H**).
- This may require removal of the motor (see section *Motor replacement module 105, page 24* or *Motor replacement module 142, page 27*)
- Open the tappet by loosening the connection screws (see *Figure 20, page 23*, **E**).
- Replace toothed belt

Assembly sequence:

- Connect the toothed belt to the tappet (see *Figure 20, page 23*).
- Attach angled plate again (see *Figure 27, page 28,* **H**).
- Attach end plate (see *Figure 19, page 22*).

CAUTION

The two spacer sleeves (**D**) must be installed as shaft stop to reproducibly limit the clamping path of the toothed belt.

- Connect carriage unit and tappet (see *Figure 18, page 21*, **A**)

6.1.9 Replacing drive set module 105

Disassembly sequence:

- Disconnect the carriage unit from the tappet by loosening the two connection screws centrally installed in running direction (see *Figure 18*, *Page 21*, **A**).
- Remove the deflection -side end plate by loosening the four connection screws. The toothed belt is relieved (see *Figure 19, page 22*, **C**)
- Remove the motor (see section *Motor replacement module 105, page 24* or *Replace gear toothed belt* module 105*, page 26*)
- Remove the motor-side angle plate (see *Figure 27, page 28*).
- Open the tappet by loosening the connection screws (see *Figure 20, page 23*, **E**).
- Push out the drive set by loosening the four attachment screws one by one (see *Figure 28*, bottom).

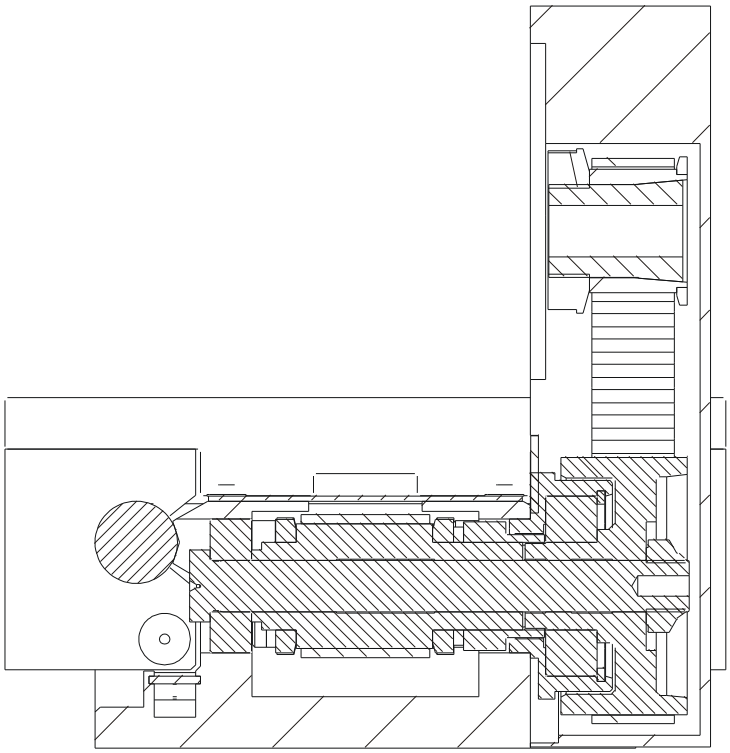


Figure 28: Cut view drive set module 105

Assembly sequence:

- Install new drive set and tighten attachment screws
- Install angle plate again
- Install motor flange and motor again (see section *Motor replacement module 105, page 24* or *Replace gear toothed belt module 105, page 26*)
- Connect the toothed belt to the tappet (**E**), (see *Figure 20, page 23*).
- Attach end plate (see *Figure 19, page 22*, **C**,**D**)
- Connect the carriage unit to the tappet (see *Figure 18, page 21*, **A**).

6.1.10 Replacing drive set module 142

Disassembly sequence:

- Disconnect the carriage unit from the tappet by loosening the two screws centrally installed in running direction (see *Figure 18, Page 21*, **A**).
- Remove the deflection -side end plate by loosening the four connection screws. The toothed belt is relieved (see *Figure 19, page 22*, **C**)

NOTE Pay particular attention to ensure that the two spacer sleeves are not lost.

- Loosen the toothed belt by opening the tappet screws,
  (see *Figure 20, page 23*, **E**).
- Remove motor flange cover by loosening the screws of the motor flange,
  (see *Figure 26, page 27*, **X**).
- Loosen the motor attachment screws; the gear toothed belt is relieved. Remove gear toothed belt and motor
- Remove the motor -side angle sheet (see *Figure 27, page 28*, **H**).
- Remove the toothed belt from the shaft of the drive set by loosening the screws,
  (see *Figure 29*, bottom, **Y**).

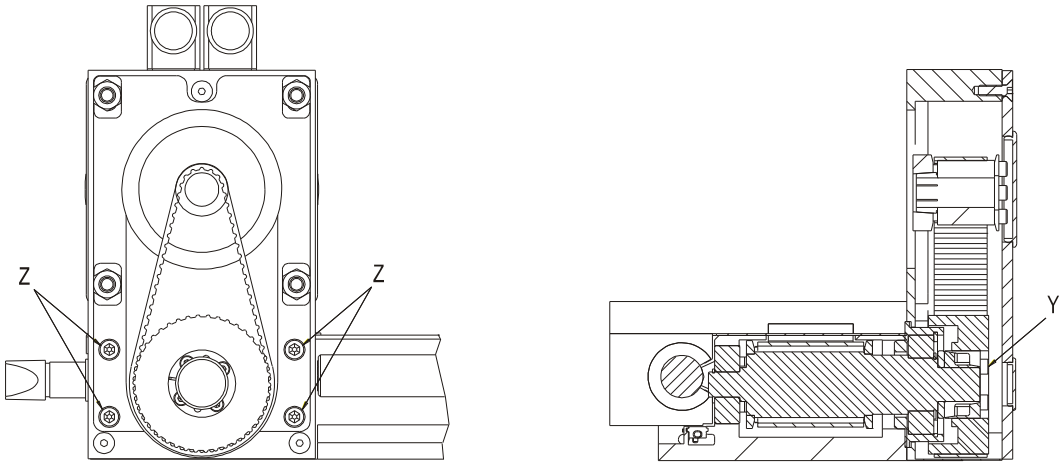


Figure 29: Drive set module 142 open and cut view

- Remove motor flange from the linear unit by loosening the screws (**Z**).
- Remove defective drive set from the guide profile

Assembly sequence:

- Insert new drive set
- Attach motor flange to the linear unit by tightening the screws (**Z**).
- Connect the drive toothed belt to the tappet (see *Figure 20, page 23*, **E**).
- Remove end plate (see *Figure 19, page 22*, **C**,**D**)

CAUTION

The two spacer sleeves (**D**) must be installed as shaft stop to reproducibly limit the clamping path of the toothed belt.

- Attach angle plate (see *Figure 27, page 28*, **H**).
- Install motor flange (see *Figure 29, page 30,* **Z**).
- Connect toothed disc with drive set shaft by clamping set.
  Push the clamping set all the way to the rear. Observe that the screws (**Y**) (see *Figure 29, page 30*) are tightened evenly in sequence. Check that the toothed disc turns freely.
- Install motor to motor flange.
- Install gear toothed belt
- Push the motor away from the basic body; the gear toothed belt is tensioned. Then tighten the motor attachment screws
- Attach motor flange cover again (see *Figure 26, page 27*, **X**)

6.2 Module 105 S and Module 142 S

6.2.1 Replacing the cover belt

Module 105

- Remove retention plates and blank holders by loosening the attachment screws (**I)** and (**K**), (see *Figure 30, bottom*).
- Pull out the old cover belt, insert new, greased cover belt
- Install both blank holders and the retention plate on the motor side
- Tension cover belt, install retention plate on the end plate side, cut off protruding piece

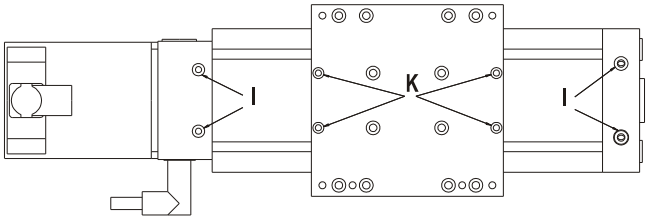


Figure 30: Top view linear unit module 105 S

Module 142

- Remove retention plates by loosening the attachment screws (**L**) (see *Figure 31*, bottom)
- Pull out the old cover belt, insert new, greased cover belt
- Install the retention plate on the motor side
- Tension cover belt, install retention plate on the end plate side, cut off protruding piece

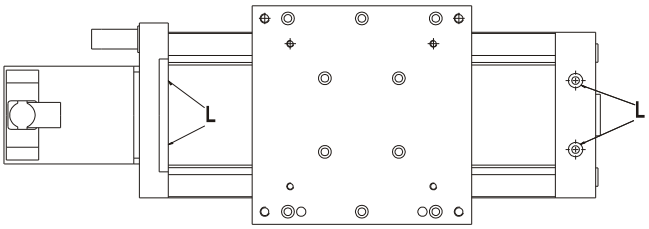


Figure 31: Top view linear unit module 142 S

6.2.2 Replace end-plate-side spindle bearing

- Remove retention plate for cover belt on the end plate side,
  (see *Figure 30, page 32* or *Figure 31, page 32*)
- Remove recessed-head screw (**N**) and threaded ring (**M**) (see *Figure 32, page 33*),
  (end-plate-side mounting bore in the spindle for fastening)

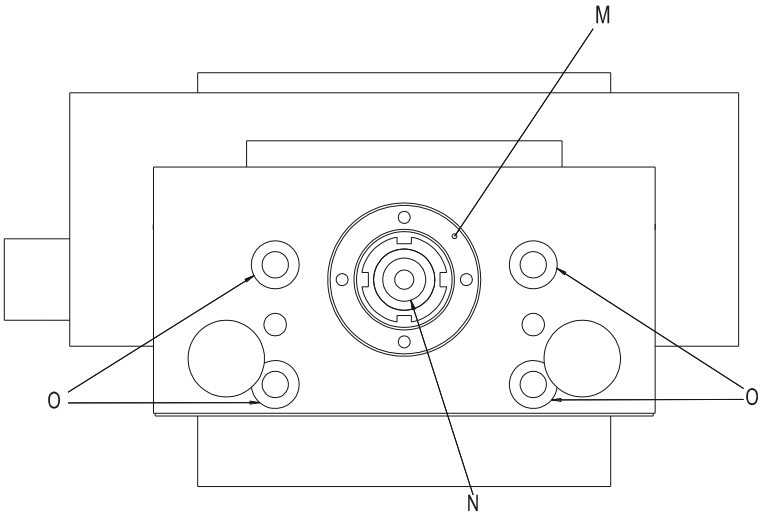


Figure 32: End-plate spindle bearing:

- Remove the end plates by loosening the four attachment screws (**O**)
- Replace end-plate-side spindle bearing
- Insert and tighten threaded ring (**M**) and secure with threadlocker
- Install end plate on spindle with the groove nut (**N**) (end-plate-side groove-nut mounting bore in the spindle for fastening)
- Screw on end-plate
- Tighten groove nut (**N**) and secure with threadlocker.
- Tension cover belt and install retention plate

6.2.3 Replacement of linear bearing

- Remove retention plate for cover belt on the end plate side, (see *Figure 30, page 32* and *Figure 31, page 32*)
- Remove groove nut (see *Figure 32, page 33,* **N**).
- (End-plate-side groove nut mounting bore in the spindle for fastening)
- Remove end plates by loosening the four attachment screws (**O**) (see *Figure 32, page 33*).
- Remove clamping blocks by loosening the attachment screws (**P**) (see *Figure 33, page 34*).
- Replace linear bearings, push on clamping blocks again and connect to the carriage plate, (see *Figure 32, page 33*).

CAUTION

As of July 1999, the linear bearings are secured with threaded pins. Remove threaded pins before uninstalling the linear bearings. After replacement of the linear bearings, install the threaded pins again as safety device.

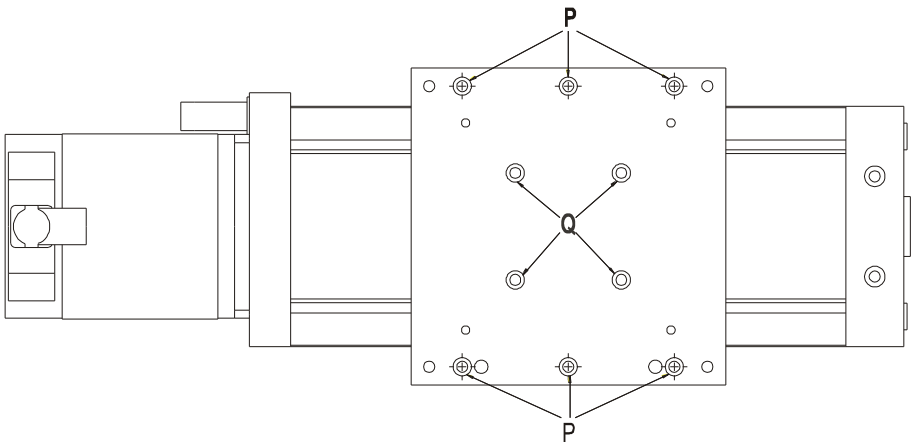


Figure 33: Top view linear unit

- Install end plate on spindle with the recessed-head screw (**N**) (end-plate-side mounting bore in the spindle for fastening)
- Screw on end plate, tighten recessed-head screws and secure with threadlocker.
- Tension cover belt and install retention plate (*see Figure 30, page 32* or *Figure 31, page 32*)

6.2.4 Replace motor

- Loosen attachment screws for motor and pull motor out to the rear
- Install new motor; always observe section *Replace coupling (version 1: stiff coupling)*, *page 35*.

CAUTION

Do not impact the motor shaft.

- Screw on motor

6.2.5 Replace coupling (version 1: stiff coupling)

- Loosen attachment screws for motor and pull motor out to the rear
- Remove recessed-head screw (**N**) (see *Figure 32, page 33*), (end-plate-side mounting bore in the spindle for fastening)
- Push carriage towards motor flange; spindle and coupling protrude from the basic body (see
- *Figure* 34*, page 35*).
- Remove old coupling, install new one (use extractor)
- Push back carriage, pull spindle back into the end plate by recessed-head screw
- Tighten recessed-head screw (end-plate-side groove nut mounting bore in the spindle for fastening) and secure with threadlocker
- Install motor on sliding seat
- Screw on motor

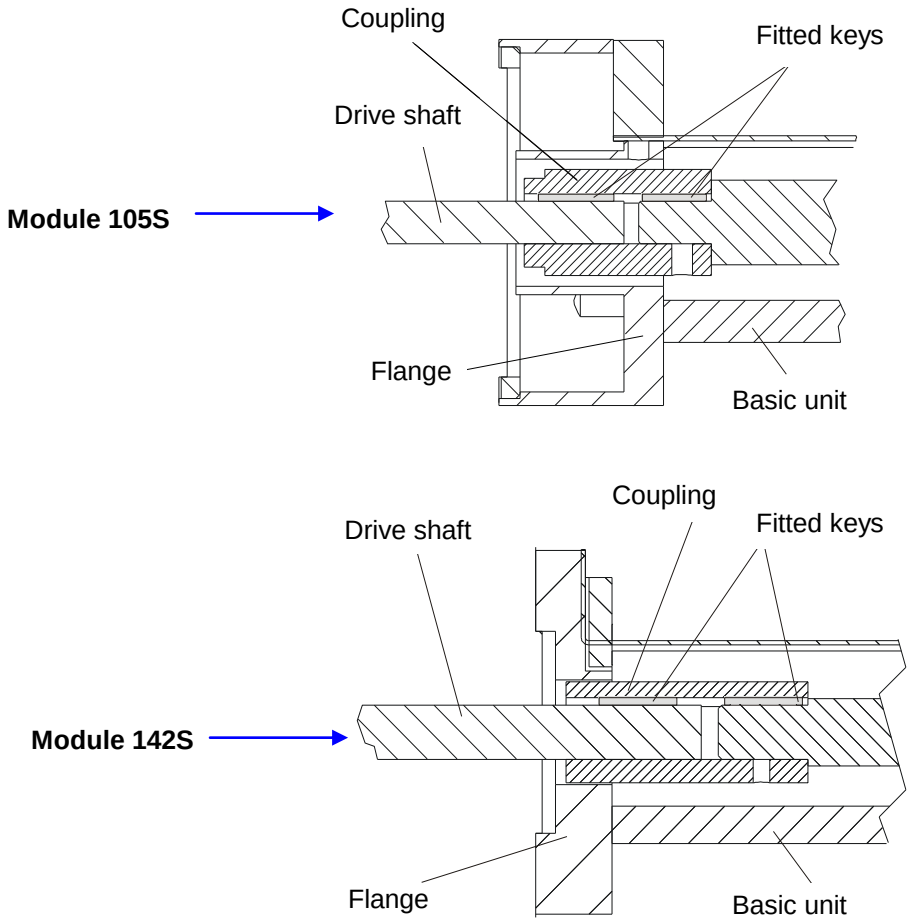


Figure 34: Cut view (coupling), version 1

6.2.6 Replace coupling (version 2: Elastomer coupling)

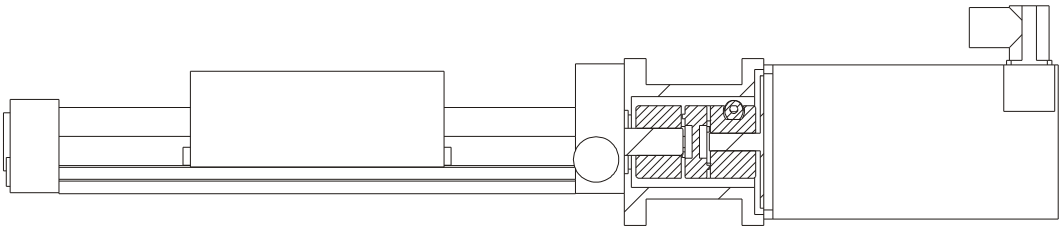


Figure 35: Cut view (coupling), version 2

- Loosen attachment screws for motor and pull motor out to the rear
- Loosen clamping screws
- Remove old coupling halves
- Install new coupling halves
- Tighten clamping screws

CAUTION

Tightening torque 11 Nm.

- Install motor and tighten attachment screws

6.2.7 Replacing the initiator

- Desolder the initiator cable from the sleeve
- Loosen threaded pin of the initiator
- Replace cover strip and defective initiator through the provided bores in the end plate
- Solder the initiator cable to the sleeve.

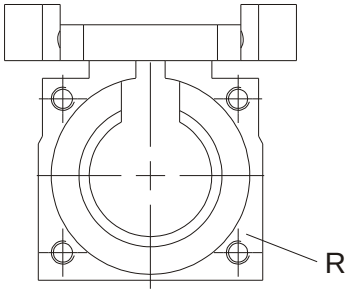
6.2.8 Replacement of spindle

Disassembly sequence:

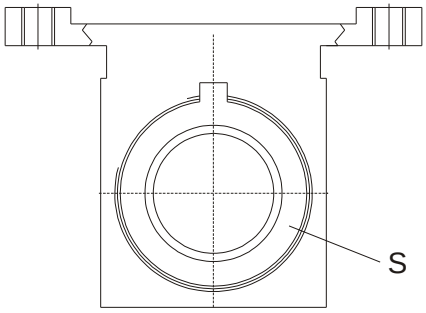
Caution

Never turn the spindle nut off of the spindle!

- Remove the motor
- Remove retention plate for cover belt on the end plate side (see *Figure 30, page 32* or *Figure 31, page 32*)
- Remove recessed-head screw (**N**) (see *Figure 32, page 33*)
  (end-plate-side mounting bore in the spindle for fastening)
- Remove end plate by loosening the four attachment screws (**O**) (see *Figure 32, page 33*).
- Disconnect carriage from the tappet by loosening the attachment screws (**Q**)
  (see *Figure 33, page 34*).
- Remove spindle with tappet from the basic body towards the end plate side
- Disconnect tappet from spindle nut; for module 105 S, the pressure plate (**R**), and for module 142 S, the threaded ring (**S**) (see *Figure 36, page 37*) must be removed from the tappet
- Remove the tappet from the spindle nut



Module 105 S



Module 142 S

Figure 36: Tappet module 105S and module 142S

Assembly sequence:

- Install the tappet on the new spindle nut. The tappet opening points towards the end-plate-side
- Install the pressure plate for module 105 S and the threaded ring for module 142 S and secure with threadlocker
- Re-install the coupling of the defective spindle on the new spindle
  (see
- *Figure* 34*, page 35* or *Figure 35, page 36*)
- Insert spindle into the basic body from the end-plate-side
- Connect the carriage plate to the tappet
- Install end plate on spindle with the recessed-head screw (**N**) (end-plate-side mounting bore in the spindle for fastening)
- Screw on end plate, tighten recessed-head screws and secure with threadlocker
  (see *Figure 32, page 33*)
- Tension cover belt and install retention plate
  (*Figure 30, page 32* or *Figure 31, page 32*)
- Move the carriage manually back and forth across the entire stroke. The carriage must move evenly and easily throughout the range
- Install motor

6.3 Module 105 and module 142 parallel drive

The following section explains the deviations between parallel drive systems and single linear module.

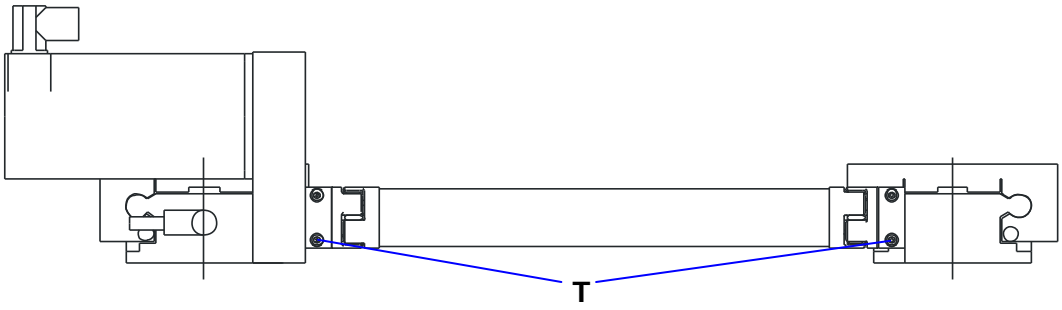


Figure 37: Parallel drive

6.3.1 Replace shaft coupling connection shaft

The connection shaft between master and slave axis can be removed and re-installed without disassembly of one of the two axes (*see Figure 38, page 39*)

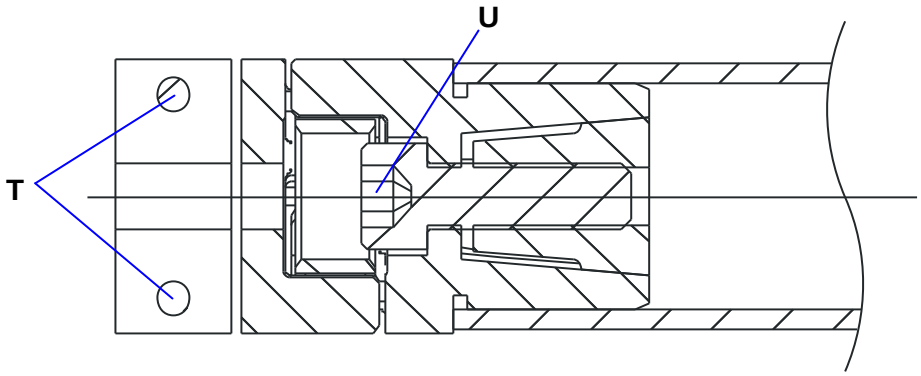


Figure 38: Cut view shaft coupling of the parallel drive

- Loosen the attachment screws (**T**), of the shaft couplings integrated into the connection shaft (see *Figure 38*).
- The connection shaft can be removed in one piece
- Loosen the clamping screw (see *Figure 38*, **U**). The tension cone comes loose
- Shaft coupling and connection pipe can be disconnected
- Assemble new shaft coupling and connection pipe
- Tighten clamping screw (**U**) with 12 Nm
- If the carriages of master and slave are not mechanically connected, push the carriages of master and slave to the stop on the end plate or motor side
- Install connection shaft
- Tighten attachment screws (see *Figure 38*, **T**) with 8.5 Nm

6.3.2 Replacing the slave drive set

Disassembly sequence:

- Loosen the attachment screws (**T**), of the shaft couplings integrated into the connection shaft (see *Figure 38, page 39*).
- Remove connection shaft
- Disconnect the carriage unit of the slave axis from the tappet by loosening the two connection screws centrally installed in running direction (see *Figure 18, Page 21,* **A**).
- Remove the end plate of the slave axis by loosening the four connection screws (**C**). The toothed belt is relieved (see *Figure 19, page 22*).
- Remove the drive-side angle sheet of the slave axis
- Open the tappet of the slave axis by loosening the connection screws (see *Figure 20, page , 23,* **E**).
- Remove retention ring (**V**, module 105) or pressure plate (**W**, module 142), (see *Figure 39, page 40*)

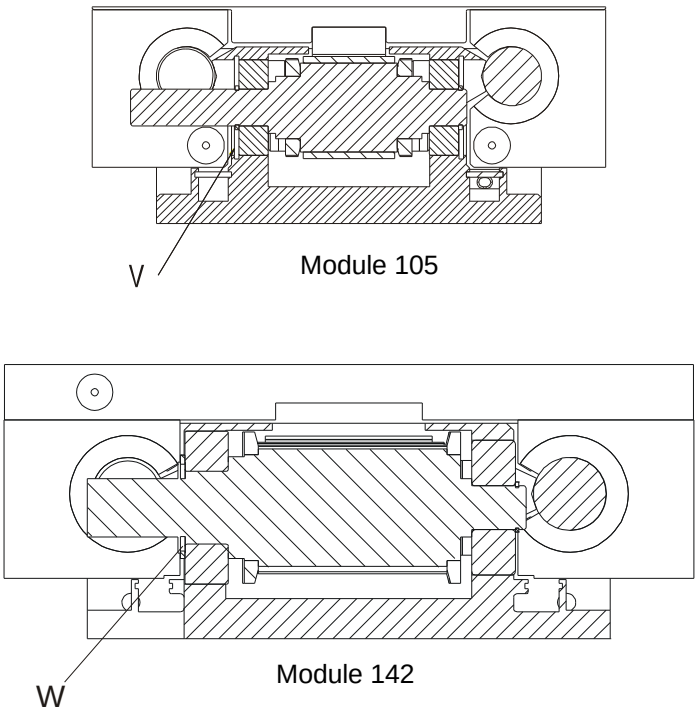


Figure 39: Slave drive set module 105 and module 142

Assembly sequence:

- Replace the slave axis drive set
- Install the retention ring (module 105) or pressure plate (module 142)
- Connect the toothed belt to the tappet
- Install the angle plate again
- Install end plate
- Connect the carriage unit to the tappet
- Install connection shaft
- Tighten the attachment screws (**T**)

7 Replacement, wear parts

7.1 Module 105

Designation	Article number
Type 16 linear bearing	1000466
Deflection unit	525137
Drive unit	customer-specific*
Drive unit parallel drive (slave)	525822
Toothed belt/tooth	732766
Guide shaft ∅16mm	025195
Gear toothed belt	customer-specific*
Torsion coupling module 105 PA	1063251
Initiator ind. PNP normally closed contact	025165
Initiator ind. PNP normally open contact	726744
Special grease for linear axes 50 gr.	732934

7.2 Module 105 S

Designation	Article number
Type 16 linear bearing	1000466
Spindle	customer-specific*
Coupling	customer-specific*
Guide shaft ∅16mm	025195
Initiator ind. PNP normally closed contact	025165
Initiator ind. PNP normally open contact	726744
Special grease for linear bearing 50 gr.	732934
Special grease for spindles 50 gr.	729148

* Project-related replacement and wear parts lists must be observed.

7.3 Module 142

Designation	Article number
Type 20 linear bearing	1000469
Deflection unit	1034955
Drive unit standard	526783
Drive unit parallel drive master	526785
Drive unit parallel drive slave	525817
Toothed belt/tooth	732765
Guide shaft ∅20mm	025794
Gear toothed belt	customer-specific*
Torsion coupling (for parallel drive only)	1063253
Initiator ind. PNP normally closed contact	025165
Initiator ind. PNP normally open contact	726744
Special grease for linear bearing 50 gr.	732934

7.4 Module 142 S

Designation	Article number
Type 20 linear bearing	1000469
Spindle	customer-specific*
Coupling	customer-specific*
Guide shaft ∅20mm	025794
Initiator ind. PNP normally closed contact	025165
Initiator ind. PNP normally open contact	726744
Special grease for linear bearing 50 gr.	732934
Special grease for spindles 50 gr.	729148

* Project-related replacement and wear parts list must be observed.

8 Declaration of incorporation

EC declaration of incorporation in the sense of the EC directive 2006/42/EC (machinery), Annex II B

The manufacturer:

IEF Werner GmbH

Wendelhofstraße 6

78120 Furtwangen - Germany

hereby declares that the following products (the incomplete machines/partial machines):

Designation	IEF Werner parts group numbers
Module 105 / 105S Module 142 / 142S	Module 105: TG1000012; module 105S: TG1000014; module 142: TG1000015; module 142S: TG1000017

where possible based on the scope of delivery, correspond to the following basic requirements of the directive on **Machinery (2006/42/EC)**:

- Annex I, item: **1.1.2**; **1.1.3**; **1.1.5**; **1.3.2**; **1.3.4**; **1.5.1**; **1.7.3**.

The incomplete machines also correspond to the following further directives:

Directive **2004/108/EC** of the council, dated 15 December 2004, for harmonisation of the legal provisions of the member states on electromagnetic compatibility.

Directive **2006/95/EC** of the council, dated 12 December 2006, for harmonisation of the legislation of the member states regarding electrical equipment for use within specified voltage thresholds.

The technical documents were generated according to Annex VII part B and may be electronically submitted to the national authorities upon justified request.

List of some applied harmonised standards:
EN ISO 12100-1,-2 / EN ISO 13857 / EN ISO 13850 / EN 60201-1

Commissioning of the incomplete machine delivered by us is not permitted until it has been determined that the overall system into which the incomplete machine is installed meets the basic safety and health protection requirements according to Annex I of the above EC directive 2006/42/EC.

Name of the documentation officer: Frank Reichelt, technical editor

Address of the documentation officer: see manufacturer's address

Furtwangen, 06 February 2010

Manfred Bär (manager)